# The Madras Forest College Magazine.

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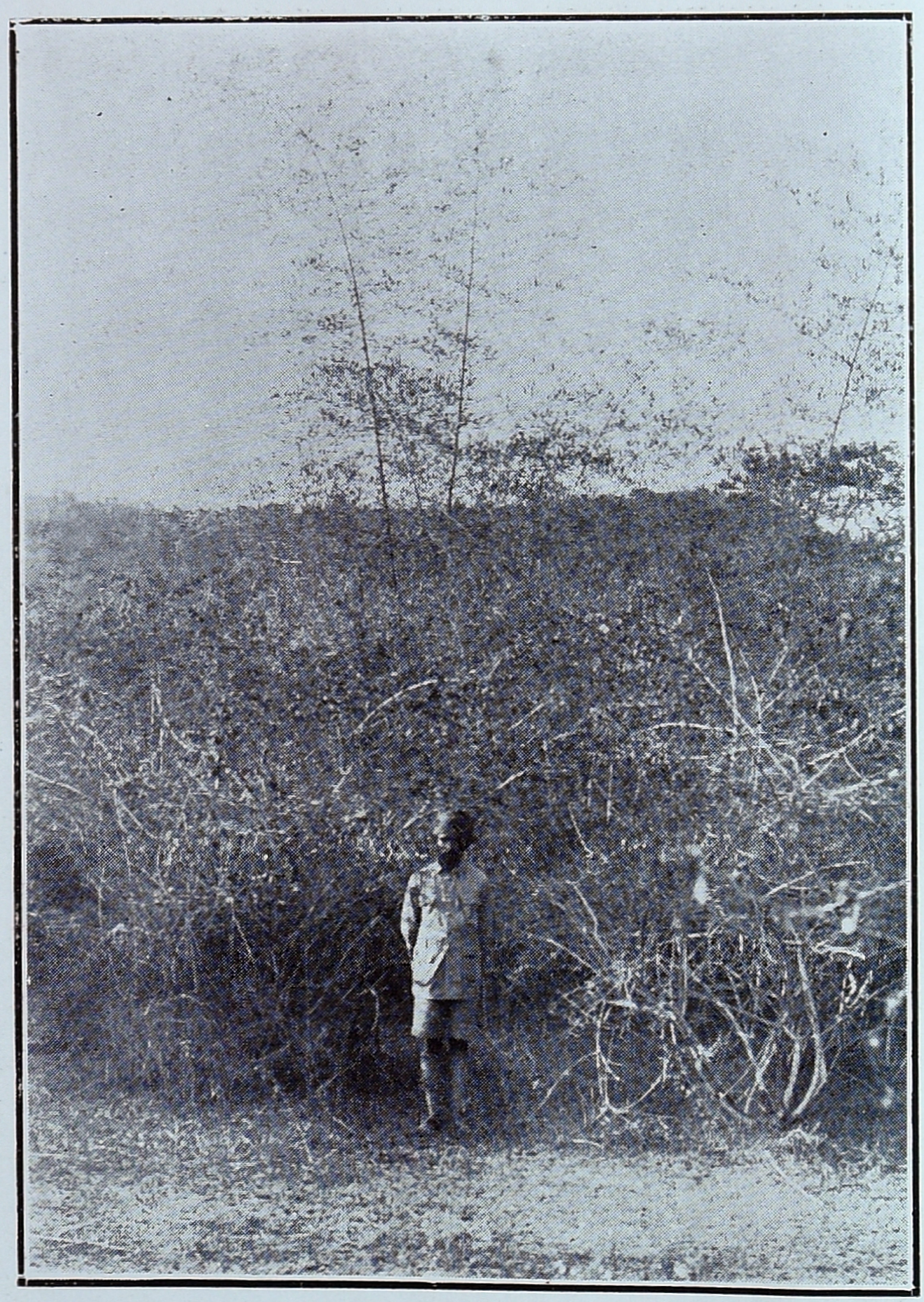

Bamboos five years old coming through *Lantana* in Gulhatti Reserve, North Salem Dn.

PHOTO BY: RAO SAHEB S. RANGASAMI AYYANGAR, M. R, HONS.

THE

# Madras Forest College Magazine.

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*The Managing Committee do not hold themselves responsible for opinions expressed by contributors.*

## The Lantana Problem in Aiyur Forests.

*By,*

*P. S. Sivaramakrishnan, B. A.,*

*Senior Student, Madras Forest College.*

The senior students of the Madras Forest College, Coimbatore, 1934 - 1936 division, camped near the little village of Aiyur in Denkanikotta East Range, in North Salem Division, from the 18th. to 31st. January, 1936, to study the silviculture and extraction of Sandal, and lac cultivation. While here, they studied also the problems relating to the destruction which *Lantana* is causing to these forests, by invading the grazing grounds, increasing the fire damage and incidence of spike in Sandal. In the following few lines I propose to write about *Lantana* and a possible way of getting rid of this pest from these forests. The Lantana problem is

by no means a new one and the subject has been dealt with by Mr. Beadon Bryant, Mr. Lodge, Mr. Tireman and many other distinguished Forest Officers in different parts of South India at different times.

*Lantana aculeata* Linn. (Syn. *L. camara* Linn.) belongs to the *Verbenaceae* — to which also belongs the majestic teak and the lowly *Verbena*. Like teak it is extremely tenacious of life, gregarious, and immune to grazing. It is a native of tropical America and was brought to India in a flower pot by a missionary for use as a hedge plant. With its great powers of adaptability to to the varying conditions of soil and climate and with its bright red or reddish yellow or white flowers and with its sharp prickles and hispid leaves it is well suited for a hedge plant if kept under strict discipline and constantly trimmed with shears. Soon after its introduction into this country as a hedge plant, it began to spread over the area which it pretended to protect and soon advanced from the hedges to the fields and succeeded in gaining a foothold wherever conditions were favourable to its growth and development, with an alarming rapidity. Areas which in one year contained only a few bushes have often been covered with a dense, impenetrable mass of it within a short span of time. Its dense growth has covered the ground completely rendering the natural regeneration of most of our valuable species difficult. By its inflamable nature when dry it has increased the difficulty of fire protection. It seems to have gained ground here by the frequent fire damage to which the scrub jungles are often subjected. In ecological language, the present position of Lantana here may be described as "Lantana sub - climax" i. e., it tends to reach the static stage.

**Possible reasons for the presence of Lantana in large numbers in these forests.**

It is a truism that where blanks have been created by indiscriminate fellings or by fire or where temporary shifting cultivations have been abandoned, Nature, in her desparate attempt to protect the soil, fills them up with armed plants which can successfully ward off the attacks of most animals except perhaps man, Lantana being one of the most common of those favoured by Nature. Fire seems to have been the cause of Lantana invasion here. There are many favourable factors which help it to get established here. Being an armed plant it is not eaten even by goats and thus it has got a decided advantage over its associates which are grazed by cattle. Its powers of adaptablity are great. It is a light damander and grows well even on poor, exposed soil. It seeds profusely and the seeds are widely dispersed by various kinds of birds. It is a shallow rooted species, and can reproduce itself by root suckers. It prevents other species from coming up under its dense shade. It reduces the moisture content of the soil by making the soil caked. Above all, it secretes a toxic oil and this renders the regeneration of other species in its neighbourhood difficult.

**Is Lantana a friend or foe ?**

In spite of the fact that lantana is a menace to our forests in more ways than one it has still got its own champions. Let us now see what benefits it can possibly give in a Sandalwood forest or in a teak plantation. Sandal finds in Lantana a good nurse in its seedling stage by protecting the Sandal seeds from squirrels and bandicoots. Sandal has come up in places in the midst of Lantana bushes and thus it creates an impression on the casual

observer that Lantana is beneficial to Sandal plants But it has been proved by Rao Sahib Rangaswami Iyengar that among the hosts which impart a spike resisting power to Sandal, Lantana is at the lowest step of the ladder offering as it does 0% resistance in its association, whereas *Azadirachta indica* and *Semecarpus anacardium* give as much as 99% resistance. Whatever advantage Lantana may claim as a good nurse of Sandal in its infancy, its inflamable nature during hot weather outweighs all other considerations for its retention in the forests as a nurse of Sandal. In a teak plantation with Lantana as an under plant in Java, Mr. De Costa has proved that in Lantana plots the height growth is less by 33.3% than what it is in non-Lantana plots. This is probably due to the extreme sensitiveness of teak roots to root competiton with a shallow rooted species like Lantana and the toxicity of the latter. Teak and Lantana are related species and probably have similar requirements on the site. Thus it is clear that Lantana is a foe of our forests, and it should be our constant endeavour to nip it in the bud.

### Remedial measures.

1. *Uprooting*. Various means have been tried in the past for the extermination of Lantana by uprooting and burning. The rates of eradicating Lantana vary from Rs. 4 to Rs. 50 per acre according to the growth and density of stocking (it may not cost Rs. 50 to clear one whole acre of virgin forest ! ! ). A large amount of money has been spent in this method without any appreciable success.

2. *Biological control*. This consists in the destruction of Lantana by an insect agency which can prey on it just as the Cochineal insect is destroying the prickly

pear. *Orthusa* bugs were found to prey upon Lantana and on being solicited for advice on the matter Dr. Beason said that it can prey on other vegetation as well and the idea has been dropped. The biological control is full of danger in this way that the insects which destroy it in one country may turn out to be a "stork king" in another country to other plants.

*3. Chemical control.* This consists of spraying Lantana thickets with Sodium chlorate solution.* This is rather of academical interest due to the difficulty of controlling the work in the field. Girdling of Lantana and applying Atlas solution is both expensive and difficult to undertake in practical silviculture.

*4. Ecological method of control* This consists in the planting of a fast growing, hardy species like bamboo under Lantana thickets either by seed or by rhizome cuttings and allow Lantana to nurse it, only to be eventually killed outright like the tree that lent a branch to the axe and having given that got its death blows on on its very roots. The photograph shows bamboos five years old coming through Lantana in Gulhatti Reserve. We saw a patch of forest in Gulhatti Reserved Forest where Lantana growth was said to be very dense in 1920 — '22. We were told by Rao Saheb Rangaswami Iyengar that there was a gregarious flowering of bamboos in the locality in the same year. The result now is that the area is clear of Lantana and is now stocked with bamboos. The ecological change here is noteworthy. With the exit of Lantana from the site there is profuse

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| | |
|---|---|
| * Sodium chlorate | ½ lb |
| Water | 1 gallon |
| Spreader | 2 Oz. |

Diluted with an equal quantity of water and sprayed.

regeneration of many valuable species including *Dalbergia latifolia*, *Pongamia glabra*, *Anogeissus latifolia*, and *Terminalia chebula*. The success of the bamboo experiment emphasises the important role of ecology in getting rid of what is regarded as a pest in our forests. This is a Sandal area that is being slowly but surely invaded by Lantana which as we said elsewhere affects Sandal to spike infection due perhaps to its toxic oil which weakens the Sandal plants in their association. Bamboo (according to the latest research) gives 60% resistance to spike to Sandal in its association and this is a decided improvement over Lantana as a host that offers 0% resistance. The cost of introducing *Bambusa arundinacea* under Lantana thickets in this locality comes up to Rs. 9 for two years. There is an ever increasing demand for bamboos in the Bangalore market.

*Cassia siamea experiment*:—Another experiment that is being carried out here to check the spread of Lantana is by introducing *Cassia siamea* in cleared patches of Lantana. The introduction of *Cassia siamea* is for all intents and purposes an ecological method of control. *Cassia siamea* is a fast growing light demander with a spreading crown. Though it is a hardy and an evergreen species it does not grow well under shade and hence its introduction involves clearing of Lantana and burning the site before it is brought in. The cost of regenerating Cassia siamea in patches works out to Rs. 4 per acre.

Basing on the successful control over Lantana in the research plots, the latest Working Plan for North Salem forests has prescribed that *Cassia siamea* should be grown in patches of 20' radius over an area of 50 acres in each Sandalwood felling coupe evey year. Due to

the difficulties in undertaking intensive work over such a vast area, the area to be worked has been reduced to 10 acres. In places where the Lantana growth is very dense, lines are cut at intervals of one chain such that they run parallel to each other. The width of the lines is fixed as 5' and these lines are to be cleared of all growth. Similar lines are cut across base lines at one chain intervals so as to get the chain squares. Midway between these, Lantana is uprooted to a radius of 20' by leverage and pressed to a height of 4' in circular heaps having a radius of 10'. Then the stuff is burnt in or about March — April. Immediately after the burning the ash is fixed to the soil by soil working. With the early showers each patch is staked (9 stumps or seeds in each patch). Stump plants give a greater percentage survivals.

So far as one could see successful control of Lantana may be obtained by this method. It is noteworthy that Lantana has not invaded these plots during the year while they hold their sway outside the patches. But there is a disputable point about *Cassia siamea*. It requires more than Rs. 4 per acre, and if we go on planting acre after acre what are its possibilities? Will it be able to give a profitable return? Has it a demand or is there a likelihood of a demand for it? All these are rather difficult questions and the wise or otherwise of the question will not be made known for some time to come. But we can say now that the locality being a Sandalwood area (and that too a spiked area) what is desirable here is a good host for Sandal which will also keep down Lantana. *Cassia siamea* is included in the panel of good hosts imparting as it does, 80% resistance and the general indications are that it will keep down Lantana and should it succeed in eliminating Lantana and giving

more Sandal heartwood by building up resistance against spike and other allied diseases, we shall be more than justified in the extra expenditure and trouble that we incur on the control of Lantana by this method.

To conclude, the general direction of the control seems to be certain, and that is in the ecological method of control wherein we rely on Nature to exterminate Lantana from places where we do not want it. Whatever the ultimate solution may be the control measures have to be taken up after very deep consideration. If it is by insect agency their action and reaction on Lantana and the surrounding plants must be carefully studied. If the control is to be effected by the introduction of another species either indigenous or exotic then all the available information about them must be carefully studied. Above all more information about the ecology of Lantana should receive our first consideration.

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## A Short note on Hardwickia binata Forests of Mettupalaiyam Range.

*By,*

*S. Sundara Varadachari,*

*Range officer:-Mettupalayam.*

One of the lesser known timber species which bid fair to become a sleeper wood is "Hardwickia binata" popularly known as "Acha" or "Karachi" in tamil districts. Let me now proceed to discuss as far as possible its sylvicultural aspect, its distribution etc., in the forests of this Range.

The forests are of a mixed deciduous type and are irregular. No distinct gradation of ages exists but variation of density is met with from open grassy blanks to dense mixed forest.

This species which is hardy and slow in growth, is found generally distributed under every variations of soil aspect and gradient, but is remarkable for its growth especially in the Bhavani valley forests up to an elevation of about 2500 feet. Sparse growth is not met with in the Nilgiri Eastern Slopes R. F., Thadagam, and Gopinari R. F. but the growth in these Reserves except in a few cases are stunted and knotty and the trees are unfit for any purpose. Perhaps the stunted and distorted growth might be due to fires and heavy hackings in the past. From the protection these forests have been long enjoying, this species tends to spread itself and hence we see young plants up to saplings in fair abundance and in course of time they may dominate the other species.

But the feature of its distribution in Bhavani valley calls for special mention. The zone of this species is quite marked. It does not extend much to the south bank of the river but extends fairly higher up the slopes, say, about a mile up from the northern bank. It starts about a mile and a half east of Neeralaai and spreads westwards up to the Perali stream and then ceases to appear until we reach the Manar River. Again in the plain portions of Manar forests they reappear but are thinned as we approach the Mannarghat forests on the west. This belt of forest will comprise roughly about 1200 acres. But this cannot be taken as indicating that the whole area is fully stocked. On a modest estimate it may contain about 3000 trees of all sizes, and about 2000 trees fit for extraction.

The growth of the species in this valley is remarkble. Many trees of straight long boles devoid of knots or apparent distortions with sizes ranging from 3′ 6″ to 13′ 6′) in girth are met with, but their value will surely deteriorate if they are allowed to stand any length of time

unexploited. As the leaves are much valued as fodder for cattle, the graziers in times of drought in the past cut the young branches for feeding the cattle thus reducing the chance of trees developing a good crown and put on girth increment. These evils are fast disappearing and propagation of this species is rendered easy enough.

The timber is extremely hard & heavy. Though it can be used for building purposes the popular choice is against it owing to a superstitious belief, which, however, is slowly vanishing. At present it is being tested as to its suitability for Railway sleepers. If the experiment proves successful a great future lies for this species.

The Working Plan for North Coimbatore prescribes extraction of 200 B. G. and 100 M. G. sleepers for supply to the Railway. But an attempt was made during the year to enumerate all exploitable trees within accessible distance with a mininum girth of 3½ ft. Out of 1040 trees marked, 25 were found to be unsound but there are yet some more in more remote localities unenumerated. As enough experience has not yet been gained to assert definitely the number of sleepers of high quality without boxed heart which each tree of a certain girth could produce, it was ordered, to start with, to fell trees which would yield 10 M. G. and 10 B. G. sleepers. 2 trees were felled and converted into 20 sleepers and were transported to the Range Office for inspection and pass by the Utilization Officer and the latter passed only 16 sleepers. But subsequently after another inspection the number was found to be quite inadequate for undertaking an experimet and hence they were ordered to be sold in public auction. Further extraction of sleepers has been deferred on the orders of the Chief Conservator.

*Cost of extraction*:— I now give some details as to the cost of extraction and tansport. I may mention here

that the cost of extraction is fairly heavy considering the remoteness of the area and the lack of transport facilties since all the extracted sleepers have to be transported on heads for a sufficiently long distance for about 7 miles, and then carted 4 miles. Besides the tree does not easily yield to the workman's saw.

*Road*:— A rough cart track in the valley exists for about 2 miles and then it is a bridle path. If this bridle parth is improved and converted into a cart track it will prove beneficial for not only reducing the cost of extraction of sleepers but also will be useful for extraction of other valuable timbers of exploitable sizes such as Rosewood and *Vengai* which are fairly abundant in the Pillur slopes. This aspect of laying out a cart track or a rough road requires consideration and the amount spent on this undertaking will I consider have been well spent.

Time is not far off when the demand for *Hardwickia* will increase.

*Regeneration*:— I have seen regeneration of this species by seeds is remarkable and it easily spreads itself and sometimes tends to form a gregarious growth. When once it establishes itself it is not easy to kill it. In the initial stages the seedlings may be browsed over by cattle but owing to its hardy nature it survives ali kinds of injury.

Small cracks, are found after conversion on the scantlings. These may reduce the sale price. Suggestions from Officers who have better knowledge of this species will be helpful for the prevention of formation of such cracks. I venture to submit it will not pay to undertake the supply of *Hardwickia* sleepers on a commercial basis and to get a sustained yield annually, until some thing more is known of this species as the literature on this appears to be meagre.

District Forest Officer's S. O. No. 176/34–35 dated 16–1–1935. Rs. 70/- Details showing the *Hardwickia binata* sleepers converted, with cost of felling and transport up to Mettupalayam from Neeralai valley in Mettupalayam Range.

| Serial No. | Tree No. | Girth. | Workable length | Result of conversion. | | Result of squaring | | Quantity C. ft. | Cost of felling squarring | Cost of transport from Neeralai to M. T. P. 10 miles. | Total cost incurred. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Logs useful. | Logs useless | No. of sleepers L | B Thick | | | | |
| 1 | 160 | 7½ | 19′ | 3½ | 1½ | B. G 10: 9′6″ | 10″ 5½″ : | 52 | 50-6-0 | 19–8–0 : | Rs. 69-14-0 |
| 2 | 164 | 7′8″ | 23′ | | | M. G 10: 6′6″ | 8″ 4¾″ : | per c. ft. | 0-15-6 | 0–6–0 : | Rs. 1–5–6 |

By head load 7 miles up to Nellithorai........................................ ........15—0—0.

By cart load from Nellithorai to Mettupalayam 3 miles in 3 carts.... 4—8—0.

Total No. of trees marked 1040, out of which 25 trees had to be rejected owing to their unsoundness.

Sound trees 1015.

## The Cement Factory at Madukarai, Coimbatore.

*By,*

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*Student, Senior Division, M. F. College.*

The year 1933, will be a memorable year, in the history of the Coimbatore district on acconnt of the fact, that, though the question of a possible Cement industry in this presidency, has been engaging the attention of the department of Industries for the last 15 years, it was in that year, that the establishment of a most up-to-date and labour saving cement works, a great industrial achievement, was completed, viz, the Coimbatore Cement Co., Ltd., whose registered office is at Yusuf Buildings, Esplanade Road, Fort, Bombay. The Report of the Department of Industries for the year, 1933 hopes, that, as a result of the establishment of this factory, the Madras Presidency should, within a few years, be largely independent of outside supplies of this essential material, the demand for which, owing to the advent of reinforced concrete construction and cement concrete road surfaces, is likely to expand.

The works are situated at Madukarai, a suburb of Coimbatore, at a distance of a mile from the Madukarai station on the S. I. Railway, and about 7 miles from Coimbatore. Even an ordinary passenger, travelling on the Podanur-Mangalore section of the above Railway, will not fail to be struck by the tremendous change, that has come over the locality, which was, a few years back, a desolate barren waste, devoid of any vegetation, but which has now come to be the busy, buzzling centre of a big industrial organization, producing the modern high

class brand cement, known as the "Nilgiri Brand" Portland Cement. In fact it is a neat, little and tidy, compact, secluded and self-contained town by itself, with a medical dispensary, a post and telegraph office and other artificial comforts of the modern industrial age. It is just in the fitness of things that the works should be located near Coimbatore, a town important for its immense industrial potentialities and for its trade, commerce and other activities. There will be no gainsaying the fact that the industrial reputation of the place has been enhanced, not a little, by this new enterprise.

It is understood that eight of the principal Cement Companies in India, comprising the Cement Marketing Co. of India, Ltd., which is the distributing organisation for them, are represented on the Board of the Coimbatore Cement Co., Ltd., and wasteful competition has thus been avoided. The cement works have been designed for an output of 60,000 tons per year and the lay-out has been so arranged, that this can be easily trebled at a very low cost. The factory has an easy supply of the materials needed for the manufacture, with an authorised capital of Rs 35 lakhs. The S. I. Railway line runs by the side of the works and sidings have been constructed directly into the works to facilitate immediate transport of the finished product, to the various centres of demand. Further, the factory is also connected by the Main Coimbatore-Palghat Trunk Road.

Since it has come to be the usual practice with, and an indispensable item of study to, the Senior division students of the Madras Forest College, to pay a visit once in the year, to the above cement works, it is proposed to deal with it, here, in as brief a manner as possible.

*General :—What is Portland Cement?* Portland Cement is the best known of artificial cements. It was Joseph Aspdin, a bricklayer of Leeds, England, who first invented it, by discovering in 1824, that an artificial mixture of finely ground lime-stone and clay highly calcined, formed a hydraulic product. It takes its name from the fancied resemblance, which hardened mortar made from it, bears in colour and texture, to the famous and much used building stone, quarried in the Isle of Portland, off the South Coast of England. As Mr. N. N, Mitra puts it, in his book on " Materials of Construction," it may be defined as a material produced, by heatiag to a clinkering temperature, an intimate mixture of calcareous, siliceous, and aluminous constituents and finally grinding the resulting clinkered mass which is a mixture of cementitious silicates and aluminates of lime.

The proportion of the constituents must be so adjusted that whatever the raw-materials may be, their dried mixture shall contain, about 75% of calcium carbonate, the rest being clay, richer in silica than is pure kaolin.

The manufacture of Portland Cement in the Madukarai Cement Factory consists mainly of three stages : viz :—

(1) pulverising and mixing the raw-materials into liquid slurry,

(2) heating the mixture to a temperature which is near the melting point i.e. calcining to clinker,

and (3) grinding the clinker to fine powder.

*I. Raw-materials* :—Materials used for the manufacture of Portland Cement at the works are a siliceous lime-stone and a fat clay obtained from the local tanks.

The company have obtained the mining rights over an area of 415 acres of limestone adjacent to the works and 1265 acres of irrigation tank clay. It is estimated that the amount of lime-stone available in the neighbourhood is sufficient to last 150 years without going below a depth of 15 feet. The south bed deposit is only 2 furlongs from the plant and it is this that is worked first.

*Lime-stone* :—A complete layout of compressed air drilling plant together with a compressor has been installed which facilitates the supply of lime-stone. The lime-stone is carried in railway waggons and conveyed to the crushing department, where it is crushed and sent on to the stores by means of roughed rubber conveyors, every portion of the process from crushing onwards being done automatically.

*Clay-handling* :—Clay is dumped in the usual wash-mill where it is made into a thin liquid by the addition of water. Running the whole length of the storage department, is a travelling crane, a very unique and interesting contrivance and at the same time a gigantic one in size and outturn of work, worked by electricity, moving rhythmically all over, by means of which the materials are conveyed to the raw-mills. The lime-stone is then placed by the crane, into the hoopers over the raw-mills from which it is fed automatically into the mill. At the same time, clay is also fed into the raw-mill from the silo, together with a regulated supply of water in required quantities. The raw-mill is R. No. 22 Unidan Mill containing special steel grinding bodies. In the raw-mill the lime-stone and clay are intimately mixed into a slurry. An exceedingly fine-grained and well-mixed slurry is always produced and this is delivered into a sump by means of mixers. Then the

slurry is raised by pumps and delivered on the kiln charging platform above the feeding end of the kiln. The apparatus is so arranged that a regulated quantity of the slurry is regularly supplied to the kiln.

*II. Burning to clinker*:— The next operation of calcining the slurry to clinker is carried out by the rotary kiln. This rotary kiln is a marvellous triumph of engineering skill and may be said to have revolutionalised the industry during the last few years. It consists of a slightly inclined steel or wrought iron cylinder about 100 to 150 feet in length and 6 to 8 feet in diameter, inclined to the horizontal at about 1 in 30. It is lined with radial fire bricks rich in alumina, some 9 inches in thickness. The kiln is revolved by means of toothed wheels and slowly rotated by gearing.

The slurry fed in at the upper end of the burning cylinder, which ends in the chimney in its passage to the lower end, is first of all dried and disintegrated by the waste heat in the upper part of the cylinder itself. The firing is done from the end remote from that into which the wet slurry is discharged, and hence the temperature gradually rises as the lower end is reached, the maximum temperature being in the clinkering zone, which occupies the space between about 6 feet and 20 feet from the lower end. In this the temperature rises to something like 3000° F, while the gases escaping to the chimney' have only a temperature of some 500° F. The dehydrated and decomposed slurry, by the time it reaches the lower end of the kiln, is burnt to what is commonly called cement clinker of about pea-grit size. This process is purely chemical one and is a stage of the manufacture involving great responsibility since faulty burning of the material can destroy all that is valuable

in the finished product. The cement produced by the rotary process is of superior quality being more uniformly burnt material. The saving in labour is also considerable.

*Firing the kiln:*— The apparatus employed for firing the kiln is a coal Mill which is the first of its kind to be introduced in India. Finely ground coal is used as fuel and is forced into the lower or outlet end of the kiln by a jet of air issuing from a blast fan. The process of grinding the coal requires special attention, the chief point about it being, that it is thoroughly dried before the actual grinding takes place. It is the heat from the clinker which is used in drying the coal. The hot clinker as it comes from the kiln by its revolving action, falls down a shoot, where it is cooled in unax coolers, by the drawing of large volumes of cold air over it as it travels by means of the rotating action of the cooler. The blast fan employed for this purpose is mounted above the firing platform of the kiln. The coal to be burnt is dried, crushed and settles as fine dust in the hopper after passing through the air swept coal-mill. By means of a pneumatic feeding device, this fine dust is extracted in regulated quantities, intimately mixed with hot air, and fed to the coal firing fan through which a continuous stream of this finely powdered coal together with a large volume of heated air is blown by a pipe to the coal nozzle of the kiln. The amount of coal and air can be regulated to a nicety. The man in charge of the burning can tell by observing with coloured glasses through peep holes, in the end of the kiln, exactly how the combustion of the coal is going on and how the burning is proceeding. When once the kiln is lit, the blowing of this very inflammable material to the fire causes a great heat which produces the clinker.

The temperature of the gases, the speed of the motors, and every other detail connected with the process are all registered over an elaborate meter-like recording contrivance known as the control board by carrying out the necessary operations on which, the man-in-charge can control not only the various stages of the process but also can regulate the proportion and supply of the raw-materials.

*III. Grinding the clinker* :— The cooled clinker is conveyed from the coolers in laminated bucket conveyors into a clinker weighing machine by means of which it is possible to ascertain the out put of the kiln, hour to hour. Then it is fed with a proportionate quantity of gypsum (to make the cement more slower setting), into the No. 22 Unidan mill where it is ground intimately, the resulting powder being finished cement. A strong current of air carries off the dust which falls into a worm conveyor from which it is fed to the outlet end of the mill. Cement from the outlet is conveyed to an automatic weighing machine. The cement is stored in reinforced concrete silos of large dimensions.

Cement made from accurately mixed raw materials well-burnt and finely ground, should stand the standard tests for quality immediately it is ground. Hence the cement produced in the works is tested from time to time in the laboratory attached to the factory, for fineness, specific gravity, chemical composition, setting time, tensile strength, general soundness, etc after which it is considered ready for despatch.

The packing is done automatically in bags which are dropped down, when the correct weight of cement has been filled in them, the only thing remaining

being, to tie the mouth with wire (which is made so very easy and interesting to look at) and loading into the railway waggons.

The motive power employed for the working of the various plants and machinery in the factory is the electric energy from the Pykara project, The very heavy power which is necessary, is supplied by generators which have a total capacity of 3000 H. P. which is transformed and reduced for the different purposes for which electricity is used. There is an elaborate system of meters and recording devices by which it is possible to bestow the greatest care and attention in the manufacture of cement. There is also an up-to-date workshop and stores to facilitate the upkeep of this heavy and costly machinery.

Manual labour is employed only for the quarrying of limestone for the collection and conveyance of clay and for loading the bags into the waggons. All the rest of the operations are carried out automatically by mechanical contrivances.

## Birds seen at Nedungayam.

*By,*

*P. W. Davis, I. F. S.*

We really do apologise about this. In spite of dramatic appeals for contributions to this magazine—nobly responded to by some two or three officers of the Presidency—it is deplorable that the Editor is still so hard up for matter that he must needs turn to the writer for more precise information about what birds he really did see flying at Nedungayam. Firstly, because anybody can bluff this sort of awkward question with the aid of one of the popular handbooks on the subject. Secondly because the obvious answer to anybody who wants to contradict the writer is that the bird or birds in question has or have now flown. Thirdly, the Managing Committee (writer included) do not hold themselves responsible for the opinions expressed. And finally, it may sting somebody in Upper Godaveri to send us a list of grass-hopper nymphs found in his compound, or worse still, somebody in Ooty may send us his selection of fillies seen wandering across the Golf Course during the 1936 season; all of which we should be bound to print and get ourselves into hot water either with the Bombay Natural History Society or with the Nilgiri Games Association. Still, we are going to do our best. Anybody going to Nedungayam next cold weather should take this article with him. There is no necessity to suffer from eye-strain or a stiff neck. We have done it for you. (*Ed*: Come, Come; this is not the kind of pseudo-scientific dope we have been led to expect from you).

First, then there is the *Jungle Crow* (*Corvus macrorhynchos*). One of the all-blacks. In future the scientific

name will be omitted, because it takes up a lot of space, the printer will type his own version of it, and nobody will read it anyhow.

*The Southern Tree Pie* :— Easily distinguishable by its pied look. It has a black mask, white cap and breast, brown wings and a long brown or black tail. Goes around in shy couples, and has a low and rather throaty call of "chuck, chuck" evidently a term of endearment. An allied species of more varied hue is the Indian Tree Pie which has been seen here in previous years.

*The Jungle Babbler* :— In the writer's opinion this bird sibilates rather than burbles. It is a duskier race than that found at Coimbatore. Popularly the species is sometimes known as the "Seven Sisters" presumably from its habit of gathering in small and scandal-mongering flocks; there is no evidence that they smother the males at birth or resort to parthenogenesis. The White-headed Babbler is also seen but less frequently; a bald-headed Babbler is unknown except in clubs, being then often mistaken for a coot.

*The Jungle Mynah* :— Fairly common hereabouts, although rather a local species. Smaller than the common Mynah, it has a tuft of black bristles over the nostrils and lacks the yellow things behind the eye.

*The Common Iora* :— One of the very numerous greenery-yallery species to be seen here, but it is certainly not common.

*Jerdon's Chloropsis* :— This sounds like something in the garden, but it is a pretty bird worthy of a better name. It is sometimes called "The Green Bulbul" as its habits rather resemble the bulbuls'. The black throat patch and bright green plumage distinguish it. A fairly common bird here.

*The Red-vented Bulbul* :— This is the common bulbul of gardens, but not of frequent occurrence here. Again surely they could have found a more romantic name?

*The Red-whiskered Bulbul* :— A very common and attractive resident around the fringes of the forest, of sprightly and jocund disposition. The red whiskers aren't the first thing you distinguish about it, but the black ring around a white neck and chest resembling many small European boys.

*The Ruby Throated Bulbul* :— This is a dinky and dapper little bird you simply must meet, one of the more desirable residents. It will greet you with " Just look at his dirty face " but don't be put off by this familiarity, may be you deserve it.

*The Blue-headed Rock-Thrush* :— Another entertaining bird to watch. He is an annual visitor from the north, with habits very similar to those of the English Robin, and prefers a solitary life at this season. Probably he needs it after a season in a Himalayan hill-station.

*The Verditer Flycatcher* :— Another winter migrant from the north. He can be frequently seen hawking insects from trees overlooking the river. Not only hawks but circulates from tree to tree (vide popular hand books). It has a black patch in front of the eye, the rest of the plumage being bright blue.

*The Paradise Flycatcher*:— This bird is an ace for graceful stunting in the air after the luckless poochee. I have often wondered why it doesn't get hung up by its streaming tail feathers to a branch, rather like Absalom, so to speak, only by the other end.

*The Black and Orange Flycatcher*:—The cap and and wings are black, remainder of plumage a bright orange. A resident species, confined to these hill-range and southwards, they say.

*The Brown Flycatcher*:— A small brown bird with a short tail darker than the body, lower parts white. A restless bird, in and around tree foliage.

*The Scarlet Minivet*:— Was only seen once.

*The Drongo or King-Crow*:— A definitely smaller race here than the one to be seen at Coimbatore. Possibly the Grey Drongo was also seen but I couldn't be sure of it.

*The large Racket-tailed Drongo*:—you can't fail to see this bird in these forests, but whether you observe it or not simply depends as usual upon whether you are interested. I have lived here for months and not noticed it.

*The Yellow Browed Warbler*:— A minute bird of dull greenish plumage, has a double whitish wing-bar, and calls "tiss-yip" or something like it, at all events it is not a warble.

*The Crimson Throated Barbet*:– Green plumage, crimson throat-patch. Fairly common, especially in fig-trees.

*The Small Green Barbet*:— This is the wretch that keeps up the call "kotturo-kotturo-katturo all afternoon.

*The Coppersmith*:— Heard often, but not seen here.

*The White Eye*:— Another common greenery-yallery bird with a monotonous inane cry of "twee-twee", although it does possess a more attractive phrase but rarely used. Very fond of figs as well as insects. Probably a resident species.

*The Purple Sun-bird*:—Ought to be included in the Lepidoptera, but for academic reasons they call it a bird.

*The Bloossom-headed Parakeet*:— A vulgar, fast creature, one expects it to have a flowery name.

*The Blue-Winged Parakeet*:— All the senior students who copied their notes out of a book called this the "Green Parakeet" and said it had a red ring round its neck: all those which I saw had a grey head and a narrow black ring, but after all I may be prejudiced.

*The Malabar Whistling Thrush*:— Like Whispering Baritones, more often heard than seen. When observed it was silent — it had its mouth full of figs! Also called the "Whistling Schoolboy" -- rather aptly. Unlike schoolboys and baritones it wears an Oxford blue favour upon either wing.

*The Malabar Grey Hornbill*:— Is another avid fig-eater, sounded at times like a hysterical old hag up a tree, with its mewing cackle.

*The Golden-Backed Woodpecker*:—Bright crimson crest, black white and gold plumage. Has a conspicuous undulating flight and when it lands on a tree you don't have to be told it's a woodpecker.

*The White-necked Stork*:— So called no doubt to distinguish it from the Black-necked stork. Goes about in couples along the river-bed. From its dignified gait evidently one of the senior members of the River Club.

*The Brahminy Kite*:— A knowing old stager; a favourite trick of his was to wait upon a branch over-looking the river until the little Pied Kingfisher swooped

for his minnow, then he in turn dived upon the Kingfisher hoping to filch it before it disappeared down the the Kingfisher's gullet. Fishy conduct.

These are just a few of them. There are of course the Bee-eaters, Wagtails, the Pigeons and the Kingfishers, the Swifts, the Martins, the Lapwings and the Jungle-fowl which everybody knows, and there must be lots more which I don't know or didn't spot. But this I hope will satisfy the Editor!

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## EXTRACTS.

### 1. Moisture Content and what it means :

#### The Relation to various uses of Timber—Absorption by Seasoned Wood in new buildings.

Mr. S. T. C. Stillwell, B. Sc., of the Forest Products Research Laboratory, Princes Risborough, provided a great deal of interesting information for Glasgow timber trade students when he addressed them, on " Moisture Content in Timber and What It Means. "

It is well known that timber in use, even when kept in the warmest and driest situations, always contains a quantity of moisture. There is not the same general knowledge of the amount of the moisture and the way in which it may vary. Few, again, know that the amount contained is not a matter of chance, but that it is closely inflenced by the condition of the surrounding air.

These matters are of considerable practical importance, because they concern that important operation seasoning, and the ultimate stability and resistance to decay of timber in use. The first slide shown was of a freshly sawn oak log, and beside it a tank of the same diameter and length. If all the moisture of the log could be put into the tank, said the lecturer, the tank would be just over half full. The weights of wood and moisture shown in the illustration were 1,000 lb. and 850 lb., which meant that the moisture content was 85 per cent. In some species the content was lower, such as ash, 50 per cent. ; in some higher, such as elm, 120 per cent , and Scots fir sapwood, 100 to 130 per cent. In such timbers there was thus a greater weight of water than wood in the growing tree. In these species the tank would not necessarily be half full. For ash, the height of the water might be less than one-third that of the tank, for elm about five-eighths, and for spruce and Scots fir say just under and over one-third.

Another slide showed the condition of the original oak log after the wood had been converted and had air-seasoned for a considerable time—say to 18 per cent. moisture content. The tank was now filled to only one-ninth of its height. The log had lost 670 lb , i. e., 6 cwt., and more than one-third of its weight.

## *Drying Not Necessarily Seasoning.*

For all practical purposes this impressive loss of moisture represented the seasoning operation. " Seasoning is drying, " said Mr. Stillwell. " Perhaps, :to save discussion, it should be added that drying is not necessarily seasoning. If, however, the drying is carried out sufficiently carefully and slowly, the terms seasoning and drying can for all pratical purposes be regarded as the same. "

The terms " thoroughly seasoned " and " well seasoned " were commonly used in the trade and in specifications, and as used might have a wide range of meaning, said Mr. Stillwell. He showed an illustration of some panels of Scots pine and oak, the top halves of each in the condition they were in after long exposure to outdoor conditions. Their moisture content was 19 per cent. to 20 per cent. The bottom halves, originally the same width, were removed and placed indoors within the Research Laboratory for a time, and assumed a moisture content of 11–12 per cent., and the diminishsd size shown.

Both sets of panels could be said to be thoroughly or well seasoned in respect to their surrounding conditions. From the view of the cabinet-maker, however, the upper panels were far from well seasoned, while the lower panels would certainly cause trouble if used for some close-fitting outdoor job.

It was clear, then, that such terms as were used were not very exact in their description. Another picture showed the change in moisture content which occurred in air-seasoned timber piled in stick in the open during the year. The moisture content in 1 in. boards varied in this case from 16 per cont. to 22 per cent. At any time over the period [shown, the timber might be said to be thoroughly or well seasoned. For some purposes the description was, of course, exact enough, but in many cases it would describe the timber better to state its moisture content, and in no circumstances would it be amiss to use this method of expressing its condition.

## *Shrinkage and Expansion.*

In the example of the paired panels, the wider ones kept out of doors had a content of nearly 20 per cent, those indoors only 12 per cent. Why should this be ? The explanation was in the moisture conditions of the surrounding air. Except under special circumstances, there was always some water vapour in the atmosphere, the amount of which determined the relative humidity or wetness of the air.

The humidity of the air, unless it happened to be carefully controlled, was never constant, nor, therefore, was the moisture content of the wood.

Mr. Stillwell said that thus far mositure content and its variation had been discussed in the lecture as though it had great significance in itself. Actually, it had not; it was the shrinkage and expansion which accompanied all changes in the content of seasoned wood which gave it its importance. All the variations in moisture content illustrated meant changes in the size of the wood, and a possible cause of trouble in many directions in which wood was used.

Except by conditioning the air of a building, there mas no simple means of preventing the seasonal change in the moisture content and dimensions of the timber in it. Paints and varnishes were relatively ineffective. By knowing the maximum and minimum of the range of contents through which the timber would pass, however, the subsequent movement of a manufactured article could be minimised.

It was found that oak kept in a building centrally heated in winter varied in moisture content from about 9 per cent., when the heating was on, to perhaps 15 per cent. in summer. "Suppose we imagine three panels made to an exact size from timber at 18 per cent., 15 per cent., and 12 per cent., and then placed in the room. The moisture content of all three in winter will be 9 per cent. and in summer 15 per cent. The change in size will be proportional to the change in content, and so in winter the first panel will have shrunk nine units, the second six units, and the third three units. In summer the first will be three units smaller than originally, the second its orginal size, while the third will be three units larger.

"It will be clear that the smallest change from the original size has occurred in the third panel, the moisture content of which was mean of the summer and winter conditions. It is worth nothing, too, that the first panel, with its original moisture content outside the summer to winter range, will be permanently smaller than its orginal size.

"The manufacturer of furniture, panelling, flooring and other decorative woodwork, and of other timberwork in which shrinkage and swelling are undesirable, should therefore employ timber for his work which is seasoned to suit the range of atmospheric conditions to which his work will be exposed when in use. Strictly, the seasoning requirements should be adapted to suit the species, as well as the environment. For instance, it is found that for ordinary living-room conditions the moisture

content in oak should be 13 per cent., in mahogany $12\frac{1}{4}$ per cent., and in Scots pine $11\frac{1}{2}$ per cent. Except in very special cases, however, an all-round figure, say 12 per cent., would suffice for all species for house conditions."

The next slide showed the moisture-content scale in relation to various uses of seasoned timber with, on the right, a rough guide to the amount of shrinkage occurring with changes in the content. Air-seasond timber must dry and shrink if used for interior work. Shrinkage as high as $\frac{1}{2}$ in. per foot of width of board any occur in such cases.

It would be seen, said the lecturer, that 11 per cent. moisture content was the average condition of timber in centrally heated buildings. In the ordinary living-rooms of houses heated by fire, a slightly higher figure of 12 per cent. obtained, while for unheated rooms $13\frac{1}{2}$ per cent. was a fair average.

For general joinery work, 15 per cent. was considered a good figure, and 20 per cent. for high-class carpenters' work in the carcassing of a building. It was generally aasumed that drying and shrinkage in such timbers did not matter. though the drying of floor joists often left a wide gap between floor and skirting. However, there was another reason why the content should not exceed 20 per cent., for above that content timber was liable to the attack of the dry not and other fungi. This, it would be admitted, was a good reason for limiting the condition of timber to a maximum, only to be exceeded, as shown, when it was certain that timber would not remain in its original wetter condition for long.

## *Timber for Carcassing.*

" The figures for carpenters' work might be considered further. It will be noticed that the maximum figure of 25 per cent. lies outside the range of air-dried timber. Any timber which has been air-dried for sufficient time will easily satisfy the first condition.

" A maximum content of 20 per cent. is not quite so easily attained, but it presents no great difficulty. Tho upper limit of the range shown for air-dried timber is 23 per cent., but the higher contents of this range are largely due to exposure to wet during winter. Timber well seasoned under reasonable overhead cover will have a smaller range of content, and having once dried below 20 per cent., as would occur in the summer period, it would be unlikely to exceed that state again. With storage under good cover, a maximum of 20 per cent presents no difficulty at all, given sufficient time.

" Troubles which have followed the use of insufficiently dried timber for carcassing have led in some quarters to the desire for a seasoning specification with more definite meaning than ' well seasoned. ' A statement that the timber shall have a moisture content not exceeding 20 per cent or 25 per cent., according to the class of work, satisfies this requirement.

" Much of the timber already used in good building work fulfils this more axact form of specification. More could be made to do so with such little care that it would not amount to hardship. Any timber which does not satisfy these conditions cannot be termed ' well seasoned, ' and should not be used.

" Turning to timber for good joinery work, the moisture content chart shows 15 per cent. as the desirable moisture content. Only in exceptionally dry summers will exposed timber come to so low a content. and even in well-protected sheds a slight heat would be necessary in winter to keep timber dried to this degree."

## *Kilns and Warm Stores.*

Actually, kiln drying or storage in a slightly warmed room were the easiest ways of producing timber at 15 per cent. ready for use, continued the speaker. On the other hand, if the timber was not too thick and it was already well air-seasoned, storage for a short time in the workshop would bring timber to the required condition. In fact, if production was not too rapid, drying sufficient to be effective might occur in the course of the timber's passage through the workshops; while the exact figure of 15 per cent. was laid down as the desirable condition, it must be mentioned that this figure in practice need be regarded as indicating no more than the centre of a range, say 14 to 16 per cent., or even 13 per cent to 17 per cent.

" In dealing with cabinet furniture, panelling, decrorative flooring, etc , however, it is desirable that wood should be dried fairly accurately to the moisture content required by its surroundings. Not only is movement less desirable in this class of product but the large surface areas of timber involved in the work tend to make any shrinkage or experiment more obvious and detrimental, The moisture content required is in this case fixed by the type of building, its heating and ventilation, and in any case it is so low that it is well below the lower limit of the air-seasoned range.

" Kiln-drying is quite the quickest way of bringing furniture timber in general to the proper state for manufacture, but warm storage of a air-dried timber for a time is another, slower but equally effective, if the storage conditions are suitable. "

The difference between kiln-drying and warm storage was briefly explained. A kiln, said Mr. Stillwell, is a chamber in which warmed and moistened air is circulated over the timber The air must be moistened to a degree depending on the moisture in the timber. The air should be kept moister when the timber is wet and gradually drier as the timber dries. If proper facilities are provided for moistening the air and controlling the degree of wetness—as is the case in modern drying kilns—it should be possible to dry timber safely from any one moisture content to another from the green state downwards.

In a warm store only heat is provided, and the air is relatively dry. If wet timber is placed in such a store, the air conditions are too dry for safety and the timber will crack or split. If the timber is fairly dry to start with, however, and the temperature is not too high, drying will take place slowly and without damage. Air-seasoned timber placed in a room kept at a temperature, say, 10 deg. F. above the outdoor temperature, will, dry safely and gradually to about 10 per cent. moisture content. The time required will of course, depend on several factors, such as the species and thickness of the timber as well as on the effectiveness of air movement in the room.

There used to be, and still is, perhaps, some prejudice against kiln-drying. It was easily explained, for there was no easier way of spoiling timber than by improper use of a kiln. By correct methods, however, timber could be kiln-dried quickly and satisfactorily, and the present very wide and effective use of kilns in industry was the best illustration of this.

## *Moisture Absorption by Timber.*

Turning to another aspect, the lecturer said that, suppose timber was dried to, say, 10 per cent. or 12 per cent., and then placed out of doors. It had already been shown that such timber would absorb moisture, and if exposed long enough would attain a content lying between 17 per cent. and 23 per cent., i.e., the range for air-seasoned timber.

It was obvious that, as a rule, timber would not be dried to a content much lower than that at which it was required. and cases would arise where timber, once dried, could not be made use of at once. For instance, flooring might be manufactured some time before it was laid. Of course, if such tlmber was stored under suitably warm conditions, it might be kept at a constant moisture content for a long time, but this was not always practicable. Failing some such method of storage, the only protection which could be afforded was by piling the timber in bulk without spaces between the boards.

The effectiveness of this treatment might be illustrated by showing the regain in moisture content of two piles of flooring strips, both dried to 12 per cent. or less and piled in a shed, one with the timber separated by strips and one in bulk. The moisture regain of the two piles was illustrated by the speaker. In the open-piled timber the gain in moisture content was rapid and fairly uniform throughout the pile, the average content, after three months, being close on 20 per cent. In the bulk pile the regain in this time was only 2½ per cent., except in the few outer layers of the pile, where the maximum content had risen to 17 per cent.

Absorption by seasoned timber in new buildings was also touched upon. In the hurry of these present days, said the lecturer, fine decorative timberwork had often to be rushed into newly constructed buildings at the earliest possible moment. Owing to the moisture from drying brickwork, concrete, and plaster, the timber met conditions quite different from those which would ultimately obtain in the building. It might easily happen that timber in a new building would tend to come to a moisture content of 18 per cent., or more. Its final moisture content when the building was dried out would generally average about 11 per cent. to 12 per cent.

It was obvious that timber seasoned to 11 per cent. would be satisfactory in the new building, but for a short time only. As the building dried, the woodwork would shrink, aud such shrinkage would be considerable and permanent Timber dried to suit the ultimate conditions of the building, say to 11 per cent., would absorb moisture quickly and tend to swell if placed in the new building, and unless it could expand freely, damage of a permanent kind might take place. Sometimes it was possible to compromise by manufacturing the woodwork at a content intermediate between those equivaleut to the temporary and final conditions in the building ; but this was only a half-solution at best.

The ideal solution of waiting until the building was fully dry was generally considered impracticable, but often the moist conditions could be mitigated by the use of temporary heating, the cost of which in many cases could undoubtedly be justified on the saving of permanent deformation of costly and beautiful woodwork,

## *Measurement of Conditions in New Buildings.*

In conclusion Mr. Stillwell said : The simple and useful method employed to determine the conditions in new buildings

may be mentioned. It is, of course, equally applicable to any room, building, or workshop, and gives a direct answer in terms of the moisture content of the wood.

If a thin cross-sectional piece of wood is suspended in a room, it will come into equilibrium with the surrounding air in a short time. A sample, say, 4 in. by 2 in. by $\frac{1}{4}$ in. thick in the direction of the grain will require only three or four days to condition. It can then be weighed, dried in an oven and re-weighed, and its moisture content determined as in the case of a moisture sample.

If two or three different species are to be used samples of each can be tested and hung is a bundle.

— *Timber Trades Journal, 14–12–1935.*

## 2. Polyporaceous Fungi of Bengal :

Dr. S. R. Bose, president of the Section of Botany at the Indian Science Congress held on January 2–8 at Indore, addressed his audience on " Bengal Polyporaceae ", a subject to which he has devoted twenty years of critical and productive research. Certain territorial limits are implied by the title ; but the discourse also reviewed work prosecuted in many parts of the world. The sections on the origin of fungi, fossil records of Polyporaceae, morpology and systematics, and physiology of polypores, would bc directly useful to a teacher of mycology in any land and form a concise digest of modern research findings. Species of Polyporaceae found in Bengal show an affinity with the fungus flora of Malaya, and conditions for their development are determined largely by the monsoon climate of those lands. Methods of adaptation to the extremes of wet and dry weather are described, and the influences which control the discharge of spores are discussed. The cytology of reproduction has been investigated, and is quite similar to that established for other higher Basidiomycetes. Heterothallism has been demonstrated for fifteen species, eight of which are bisexual and the others quadrisexual. The problem of sex in fungi receives critical review, and culture characters of several species in monosporous culture are outlined. Chemical analyses of the organic matter and ash of polypores have been made, and the enzyme actions of some species have also received attention. *Fomes pectinatus* is used to cure weeping eczema, and *Polyporus anthelminticus* is as its name implies, a control for worms.

— *Nature, 1–2–1936.*

### 3. Wood Anatomy and Resistance to Shipworm Attack :

In these days we are still suffering from the attacks of this shipworm; the damage to piling in the Bay of San Fransisco alone in the years 1920 and 1921 being estimated at 15 million dollars. Science has so far been able to help but little, though the best remedy, creosote impregnation, was the result of scientific research. Even this is not, however, completely effective, as cases are reported where molluscs have pierced the creosoted timber, even the holes smelling of creosote.

What, then, remains of the knowledge of the Romans of a timber that resists the teredo? Nothing apparently, as a committee appointed by the Royal Academy of Amsterdam in 1869 came to the conclusion that such a timber could not be found.

Later, however, the great resisting powers of certain woods were recognised, notably of Demerara greenheart (originating from *Nectandra rodioei*, Schomb.), the wood of which both the polar ships, the *Fram* and the *Discovery*, were built, and the wood which Colonel Goethals preferred during the early years of the construction of the Panama Canal. A second wood, 'manbarklak', from *Eschweilera longipes*, Miers, from Dutch Guiana later become famous as still more resistant, though sometimes rapidly destroyed by fungi when stored on land.

The reasons for the resistance of these timbers to the teredo was not known. Demerara greenheart contains certain poisonous alkalolds, but manbarklak does not, and Prof. van Iterson suggested that its resistance might be due in part to inclusions of silica in the ray cells, which makes the wood very difficult to work and many impede the boring activities of the teredo. In the museum at Balhoa are piles of Demerara greenheart (from the Panama Canal) riddled by teredo, a disappointment due to the appearance in these busy waters of a new species of teredo. A Dutch forester, Mr. J. W. Conggrijp, followed up this observation of Prof. van Iterson, when he found manbarklak resisting much better than Demerara greenheart in canal sluice-gates of Dutch Guiana. The result of his extensive studies has been to indicate five or six species of woods from the Netherland East Indies as promising for marine construction because of their silica inclusions, notably two related species of *Metrosideros*, whilst two or three species containing poisonous substances are also recommended.

The investigation of woods from other wood producing regions from the same point of view is obviously a next step,

and in this connexion Prof. van Iterson describes in this paper a new and rapid method for the microscopic recognition of the silica inclusions.

— *Nature, 1—2—36.*

## 4. Spraying Metal Tests :

### What Experiments in India Show.

In view of the extent to which metal-coated plywood is used for many purposes, it is interesting to observe that the metal spraying of wood is said to be developing on an important scale.

Metal spraying is the process by which any metal or alloy capable of being drawn into wire and of being melted in any oxy-coal gas, oxy-hydrogen or oxy-acetylene flame is deposited by means of a special pistol on metal, wood, or any other surface. The process is coming into considerable importance for the deposition of various metals *in situ* on small and large structures to prevent corrosion due to atmosphere, moisture, heat and other causes.

The metal, which is fed to the pisol in the form of a fine wire, is melted in a blow-pipe flame, and the molten metal is sprayed by means of a compressed air jet. The heat generated by the flame is dissipated by the compressed air, so that there is visibly no detrimental effect of heat on the surface to be coated. A slight roughness of the surface is necessary; this can be obtained by sand-blasting, and is considered indispensible even in the case of wood and millboard. It tends to raise the natural grain of the wood, which is essential for a good adherence of the metal film to the wood surface.

The Wood Seasoning Section of the Forest Research Institute, Dehra Dun, India, have carried out some experiments in metal spraying with a view to ascertaining how far a film of metal sprayed on wood would protect it against changes in moisture content and dimensions due to variations in atmospheric humidity. Describing the tests in the *Indian Forester*, Messrs. S. N. Kapur and Azizal Rehman state that one air-seasoned scantling 2 ft. long of teak, haldu, sissoo, Indian rosewood, gurjun and Andaman padauk were selected and cross-cut, to give four specimens.

Due to the diversity of factors involved in the experiment it was hardly possible to draw any exact conclusions from the present investigation; but there are broad indications from which some fairly definite inferences can be made.

It would appear that the metals with low melting points, namely, tin, lead and zinc are more efficient in protecting wood against changes in moisture content and dimensions than metals with high melting points, namely, copper, brass, bronze and aluminium.

The authors quoted above add that there is one great disadvantage with the metal spraying of wood, namely, the cracking and breaking away of the metal film in coure of time due to alternate swelling and shrinkage of wood. Some of the metal coatings, for instance, those of aluminium, brass and lead were found to crack, which ultimately leads to the peeling off of part of the coating, particularly from the ends. In others, when the films expanded with the swelling of the woods, the coatings were found to have a somewhat wrinkled appearance after the specimens were again air seasoned. Due to alternate swelling and shrinkage of wood with changes in atmospheric humidity, the adherence between the metal film and the wood surface becomes weak in course of time, which leads to the deterioration of the metal film. Particularly in exposed situations, the metal sprayed wood would have a very short life.

— *Timber Trades Journal, 7—12—35.*

**5. Forest Research in India, 1933 – 34 :-**

In Madras, valuable systematic research on planting technique for teak continues to be done. The advantages of premonsoon stump planting have been so definitely established by experiments over a series of years that the method can be safely recommended for all average conditions; the same method applied to other species such as *Dalbergia latifolia*, *Xylia xylocarpa* and *Pterocarpus marsupium* also gives satisfactory results though the gain is less than with teak.

The effect of the size of teak seed (fruits) was shewn to be relatively unimportant, and where seed is cheap the best nursery method is to sow very densely direct in the nursery beds. In the all-India teak seed origin investigation, only N. Kanara seed shews any signs of superiority over the local Madras origins. In planting out stumps in medium light soils, soil working is unnecessary, crowbar planting giving nearly equally good results ; similarly the expensive forking work hitherto practised gives little better results than cheaper weeding methods without soil working. Investigations to follow the history of replacements in gaps in a plantation shewed that few survive and these rarely get up into the general canopy.

The *rab* method has extended considerably in dry fuel forests, *Cassia siamea* being very popular for the work but not so drought hardy as hitherto believed.

*Santalum album* stumps have given good results with 98 per cent. survival after 3 years and good height growth.

Many underplanting experiments are in progress in the evergreen rain forests, but growth is extremely slow. With heavy rainfall, better results are obtained from late planting (August than early June-July).

*Seed pre-treatment*:—Routine pre-treatment tests with cold, hot and boiling water were done with 22 species. Boiling water treatment improved the germinative capacity of *Acacia auriculiformis*, *Acacia cyanophylla*, *Acacia leucophloea* and *Cassia siamea*, but was harmful for nearly all the other species tried. Soaking in cold water for 24 hours definitely improved the germinative capacity of *Chloroxylon swietenia* and *Gluta travancorica*, and appeared to be beneficial in the case of *Pterocarpus santalinus* and *Terminalia crenulata*. It neither improves nor accelerates the germination of teak seed (40 tests), but does no harm.

Germination of *Cassia fistula* and *marginata* seed was greatly improved by soaking in concentrated sulphuric acid for 15 minutes. *Terminalia chebula* seed germinated better after soaking in lime-water for 24 hours.

*Seed storage:*—Tests were done with 28 species to determine the longevity of seeds stored in different ways. Results are given in the annual report.

The removal of the pulp from seed of *Santalum album* before sowing gives a very marked increase in the germinative capacity.

*Sorting seed into sizes:*—Experiments confirmed the result that the practice of sorting out and rejecting the small seed in the case of teak is not justified, the difference in germinative capacity and resulting growth from small and large seed being too small to matter.

Tests with seed from small immature, normal mature and large overmature seed bearers with several species gave inconclusive results.

Ripe seed collected at different periods during the fruiting season all gave uniformly good germination in the case of teak and *Terminalia crenulata*.

*Seed origin*:—Short-term experiments in the All-India Teak seed origin investigation again confirmed the superiority of local seed (Nilambur and Mount Stuart) as regards ease of getting germination and in growth with the exception of South Bombay plants raised from stumps at Nilambur which, though they start more slowly. have by the first hot weather outstripped the Nilambur origin plants. Attempts to establish long-term plots were frustrated owing to failure of seeds of certain origins to germinate in the nursery.

## Nursery Work.

*Shading*:—In hot dry fuel areas shading beds gave higher germinative capacity with almost all species tested, but as regards subsequent development individual species exhibited different requirements.

*Nursery methods for raising teak stumps*:—A comparison of (A) dense sowing with seed almost touching, (B) Transplanting small seedings into beds 4 in. × 4 in. espacement, (C) Notching germinating seed from dumps 4 in. × 4 in. espacement and (D) Sowing soaked seed in lines 3 in. × 1½ in. espacement, showed that method (A) gave by far the greatest numbers of useable stumps per bed, though it is the most wasteful of seed. The beds, however, after removing the required stumps in the first year, will be again fully stocked with useable stumps at the end of the second year. The other three methods in no cases gave fully stocked beds, though the stumps produced were larger. Where the cost of seed collection is low and the cost of nursery space high method (A) is evidently preferable.

## Artificial Regeneration.

### (a) *Mixed deciduous forest.*

The stocking of felling gaps in mixed deciduous forest with teak is now extensively carried out and presents no difficulties in the initial stages. There is some cause for apprehension in certain areas however where climbers and lantana are particularly aggressive that the plants may be swamped by invasive growth in later years after tending has ceased.

An experiment comparing the effect of a heavy burn, a light burn and no burn in such gap regeneration showed no difference in results between the two intensities of burn, but the gaps with no burn were definitely inferior.

*Comparison of direct sowing, entire transplanting and stumping*:—The decided superiority as regards both survivals and resulting height growth of stump-planting teak in preference to either direct sowing or entire tranplanting was confirmed. *Dalbergia latifolia, Pterocarpus marsupium* and less difinitely *Terminalia crenulata* gave the same results. *Xylia xylocarpa* gave the best results from direct sowing.

*Optimum season for planting*:—Repetitions of the pre-monsoon stump planting experiments confirmed the previous results. The conclusions that may be drawn from these experiments, which have now been repeated six times are:—

(*a*) Except in unusually dry and hot seasons, stump planting as early as the first week in April gives sufficiently good stocking (over 90 per cent. on the average) and an immense gain in height growth as compared with normal moonsoon planting at the end of May or early in June.

(*b*) Success is not dependent upon what is generally considered good planting weather.

(*c*) The stumps will stand fairly long periods of drought after they have been put in and even after they have sprouted.

(*d*) The immense advantage given by the start the teak gets over weeds or field crops more than outweighs any risk of bad stocking due to an exceptionally hot or dry season, or to other causes, and this risk can be cheaply insured against by providing a reseve of plants for stumping in the last fortnight of May should the necessity arise.

Similar experiments were done with stump planting of *Dalbergia latifolia*. *Pterocarpus marsupium*, *Terminalia crenulata* and *Xylia xylocarpa* and indicated that early planting is also beneficial in these cases though the differences are not so great as in the case of teak.

*Stump planting:—Effect of diameter of stumps*:—Teak stumps of 0.4 in. to 0.7 in diameter at the collar (=0.6 in. to 0.85 in diameter at the thickest part approximately) gave the best results. Larger stumps gave inconsistent results. Smallar stumps usually gave poorer survials and height growth. In the case of *Dalbergia latifolia* stumps 0 2 in. to 0.4 in. and possibly 0.5 in. collum diameter appear to be best, and in *Terminalia crenulata* medium sized stumps (0.5 in. to 0.7 in. collum diameter) gave the best results both larger and smaller

sizes usually giving poorer growth, though effect on survials was negligible. In *Pterocarpus marsupium* stumps up to 0.4 in. collum diameter were tested, the largest sizes giving the best results.

*Stump planting:— Effect of length of root—Teak:—* Repetitions of last year's experiments indicated no definite relationship between length of root (between 4 in and 10 in) and either percentage of survivals or resulting height growth.

*Stump planting:—Comparison of pits and crowbar hole:—* Experiments confirmed the slight advantage of 1 foot cube pits over crowbar holes, but the difference in growth is normally not likely to be worth the extra expense of digging pits.

*Storage of stumps:*—Stumps stored for 27 days before planting gave 78 per cent. survivals, the percentages falling off to 68 per cent. after 34 days, 24 per cent. after 41 days and 4 per cent. after 49 days' storage.

Casualty replacements with stumps in the second year of a teak plantation were watched. Only 19 per cent. survived after two years in one experiment and those survivors were not taking their place in the main crop. In another experiment 77 per cent. were surviving after one year. They are being watched.

A *taungya* crop of *ragi* (millet) had a definite retarding effect on the growth of teak in a plantation. With stumps planted on 6th May 1933 the heights by next February were 0.60+0.035 feet in the *ragi* strips and 0.86+0.051 feet in the conrol strips *i e.*, a difference of 27 per cent. in height growth. An experiment with early and late stump planting in the same *ragi taungya* showed that by planting as early as the 21st April, an increase of height of over 100 per cent. in the teak as compared with late planting (1st June) was obtained. Early stump planting should therefore go a long way towards counteracting the retarding effects of *taungya* crops.

### (*b*) *Evergreen Rain forests.*

All artificial regeneration work in evergreen rain forests comes under the category of underplanting and is, therefore, dealt with in part (ix) of this Chapter.

### (*c*) *Dry Fuel forests.*

Artificial regeneration of dry fuel forests by the "rab" method has been undertaken on an increasing scale in almost all divisions in which this type of forest is found. *Cassia siamea*

and *Dolichandrone crispa* are probably the two most popular species used, with *Albizzia amara, Acacia sundra. Melia indica, Acacia ferruginea* and *Prosopis spicigera* as the next most important species. *Anacardium occidentale* has also been tried in some dry localities but, though it germinated freely, it has not grown with the rapidity one expects of it. *Cassia siamea*, hitherto regarded as a hardy species, has in one or two localities died out in the exceptionally severe hot weather this year even when over six feet high and considered to be well established.

A large amount of experimental work has been done at Chittoor, but the yield of results has been meagre owing to the rigorous nature of the conditions there. The following indications were however obtained :—

(*a*) Sowing in the open generally gives better results than under the shade of existing fuel forests.

(*b*) Sowing in burnt patches gives better results than sowing in patches without a burn.

(*c*) Seedlings that survive the first hot weather are by no means necessarily established. They may succumb in the second or subsequent hot weathers. In the case of *Acacia sundra, Prosopis spicigera* and *Albizzia amara*, however, no further casualties occurred in the second hot weather.

The light-demanding nature of *Cassia siamea* has been clearly established. Whenever this species was grown under shade of any kind survivals and growth were much reduced.

*Cassia siamea* gave better results from stump planting than direct sowing both as regards height-growth and survivals. The opposite was the case with *Anacardium occidentale* which gives very poor survivals from stumps.

Experiments to determine the best season for entire transplanting in dry fuel areas indicated that :—

(*a*) July planting almost invariably gave better survivals and height growth than October planting by the following June.

(*b*) *Acacia sundra* did not give good results with entire transplanting and *Cassia simea* gave practically no survivals and appears to be quite unsuited for this method of regeneration.

*Stump planting of fuel species* :—Indications given by various experiments are :—

(*a*) July appears to be a better month for stump planting most species than August, September or October.

(*b*) *Acacia auriculiformis* and *Anacardium occidentale* are unsuited for stump planting giving very few survivals.

(*c*) *Cassia siamea* and *Prosopis spicigera* gave good results from stumps.

(*d*) No marked difference between the results from stumps with short roots and long roots (9 inches and 15 inches) was found in the case of *Cassia siamea* and *Prosopis spicigera.*

*Santalum album* :—Attempts to raise sandal among bushes by direct sowing in saucer shaped depressions covered with straw, (*dhall* seed being sown at the same time), were unsuccessful at Chittoor. Stump planting of sandal in North Salem division has given 98 per cent. survivals after three years with an average height of 4 feet 5 inches, and a maximum height of 9 feet. Planting pieces of roots cut from living trees gave indications of success.

**Tending, Thinning and Cleaning.**

Confirmation was obtained of the harmful effects of leaving seedings and transplants of *Dalbergia latifolia* unweeded.

The marked beneficial offects of A-forking in four foot wide strips as compared with B, scraping in 4 foot wides strips, C forking in 4 foot diameter circles and D weed-cutting in strips (done in 1931) were found to have diminished considerably by the third year, and will probably be scarcely discernable after 5 years.

A further confirmation of the result that forking in 4 feet wide strips is better than forking in circles of 4 ft. diameter was obtained showing that the effect of weeds as far away as 4 feet from the young teak plants is sufficiently great to cause a significant difference in height growth.

In a plot kept clean weeded during the first year the height of the teak was 130 per cent. greater than in the adjoining divisional *taungya* area with a *ragi* crop. (The cost of this clean weeding was however Rs. 31–9–0 per acre.)

Definite confirmation was obtained in two localities (6 Experiments altogether) that monthly forking throughout the year produces no increase in growth as compared with clean weeding without loosening the soil. It is evident therefore that soil aeration in itself does not confer any appreciable

benefit over and above the effect of removing weeds. The expensive operation of forking in strips (Rs. 8 to Rs. 11 per acre) is therefore unnecessary and can be replaced by scrapings which cost only Rs. 4-8-0 to Re. 5-8-0 per acre. The experiments were only done in areas with naturally light friable soil and rainfall of 60 to 120 inches. The results may not be applicable to dry localities, or places with a stiff heavy soil.

Repetitions of experiments to test the effect of cutting back and burning a teak plantation in the year after planting were done too late, and showed that whereas the burnt and cut-back plants grew significantly more than the plants cut back without burning, neither of them overtook the uncut control, It is expected that this reversal of the previons year's result where the burnt and cut-back strips grew significantly larger than the uncut unburnt control is probably due to the experiment having been done after the teak had started growing.

Experiments in the use of *Tephrosia candida* as a cover crop indicate that if introduced in the first year it is an unmitigated nuisance as a weed, and if introduced in the second year (in the Wynaad) it does very little practical good as its effect as a weed suppressor does not come into action until the teak is well out of danger of weeds. It is also very badly browsed by bison.

**Underplanting**.

*Evergreen rain forests:*—Underplanting experiments with evergreen species under the full canopy of evergreen rain forest have shown such exceedingly small growth (sometime unmeasurable after two years) that results are slow to obtain.

With the exception of *Artocarpus hirsuta* experiments in the stumping of evergreen species were all almost complete failures.

In areas with very heavy south-west monsoon rainfall (over 140 inches during July, August and September alone and a total rainfall of over 200 inches) the best season for entire transplanting was found to be August to October, but in areas with only 60-80 inches of rainfall planting in June to July gave the best results.

*Artocarpus hirsuta* gave slightly better results from entire transplants than from stumps.

No definite superiority in survivals was shown by large transplants of *Hopea parviflora*, *Mesua ferrea*, *Calophyllum*

*elatum*, *Artocarpus hirsuta*, *Dysoxylum malabaricum* and *Gluta travancorica* as compared with small transplants, but the growth of the large transplants where measurable, was greater than that of the small transplants. Transplanting in pits showed a slight superiority over transplanting into crowbar holes. Natural forest seedlings of *Hopea parviflora* gave slightly better results than nursery seedlings of the same size. The reverse was the case with *Mesua ferrea*. All these results are however unreliable owing to the very small growth obtained under evergreen shade.

**Miscellaneous.**

A small trenching experiment in dry fuel forest with direct sowings of *Prosopis spicigera* inside and outside the trench gave a significant increase in growth inside the trench due to removal of root competition by severing the roots of surrounding trees.

Experimental cultivation of *kollukattai* grass (*Pennisetum chencroides*) in Central Salem and Madura Districts to improve grazing in reserves gave promising results.

**Working Plans and Statistics.**

*Working Plans*

Five Working Plans were under compilation at the beginning of the year, of which two were completed. Two new plans were started and preliminary work for a third commenced. Three new plans were sanctioned during the year. The cost of the preparation inclusive of establishment varied from Re. 0–1–7 to Re. 0–3–3 per acre, depending upon the amount and intensity of the stock-mapping and enumerations necessary.

**Yield, Volume and Form Factor Tables.**

Eighty-eight permanent sample plots were maintained. Data for local commercial volume tables were collected and the tables were compiled by the silvicultural branch of the Forest Research Institute, Dehra Dun.

Seven linear tree increment plots have been laid out for determining the increment of the more important timber species growing in mixed forests.

**Miscellaneous.**

Ring countings on teak stumps in natural forest at Mount Stuart were continued for determining (by correlation with felling data) the increment of teak in natural mixed forest.

*Sandal spike disease research* :—The department collaborated with the Institute of Science at Bangalore, and with the Forest Entomologist in connection with their investigations into spike disease. On the cessation of the Government grant to the Institute with effect from the end of March 1934 the control of all spike disease research done by the Forest Department has been handed over to the Provincial Silviculturist.

*Lantana* :—Experiments to see whether Lantana can be suppressed by undersowing with *Bambusa arundinacea* have shown a promising start. An attempt at controlling Lantana entomologically by the introduction of the insect *Orthesia insignis* met with partial success and is being pursued.

*Climbers* :—Experiments in the eradication of *Zizyphus oenoplea* and *Acacia intsia* by poisoning them with solutions of sodium arsenite of different strengths have indicated that almost complete eradication of the *Zizyphus* and the *Acacia* can probably be attained by these means at a reasonable expenditure on chemicals. It is, however, too early to judge final results yet.

— *Forest Research in India, 1933–34, Part II.*

## 6. Soil and Forest Conservation in the United States :

The United States has now awakened to the serious position brought about by the excessive felling and destruction of forests during the last fifty years. A great campaign is taking place with the object of impressing upon the people the valuable results to be expected from soil conservation and forest conservation, which are now regarded as national problems. The work of Mr. C. A. Connaughton of the U. S Forest Service is commented upon in a recent communication from Science Service, Washinton, D. C. This investigator has studied more than 3,000 test plots in burnt-over forest land, comprising both cut-over areas and virgin timber. In general, the more severe the fire the more severe also was the subsequent erosion. On the steeper lands, lightly burnt areas, on which the fire took only the top layer of the forest floor litter (the ordinary leaf fire, so termed), little erosion was perceivable, about 10 per cent of such plots being eroded. In the case of severe fires, so high as 80 per cent of the plots showed erosion. Mr. Connaughton's research would appear to merit attention from officers connected with these matters in the British Empire. " Of course, " says the author, " where soil is eroded away from a burnt-over forest site, it is difficult to make trees grow there again—impossible, if the erosion is severe enough to lay bare the underlying rock.

But the damage is apt to be felt by people who never see or think about the forests. Hundreds of miles away, the freshets that gush through the erosion gullies accumulate as floods, in the greater rivers, piling out of their banks to wreak destruction, and leaving behind them, on lowland farms and industrial areas, burdens of silt that should be up in the hills, growing trees." This might have been written in connexion with the outer Punjab hills. The paper is given in full in the current issue of the *Journal of Forestry*.

**7. Efficiency of Wood as Fuel :**

In an age of so much and such abstruse research, it is common to find that no exact answer can be given to some of the most everyday problems. The Canadian Department of Mines found this to apply to the relative value of wood as domestic fuel as compared with coals. In Canada, this question has an importance which has long since disappeared in Great Britain. The Fuel Division of the Department has published tests by E. S. Malloch and C. E. Baltzer on the efficiency of wood as fuel for heating water in a furnace of the type normal in North America, and previously used for tests on coal and coke. Tests with an American anthracite showed a thermal efficiency of 66 per cent. Under comparable conditions, the efficiency of hard-wood (maple) varied from 50 per cent (green) to 57 per cent (seasoned wood). Corresponding figures for soft wood (pine) were 42 per cent and 49 per cent. By placing a perforated plate over the firebars, the efficiency could be slightly increased, and in all cases the loss in unburnt fuel was negligible. These figures are quite good, but the wood compared unfavourably with coals in output and in the weight and volume of fuel to be handled.

— *Nature, 14—3—36.*

## COLLEGE NOTES.

### 1. Camp Notes—Coonoor and Kargudi—(Jan., Feb., 1936).

"Lucky juniors"—that was what the senior students exclaimed when they came to know about the change in our camping programme this year. Before the Kargudi camp, we had a two weeks camp at Bandyshola, Coonoor, chiefly meant to bring about an improvement, in the health of the students. The cool, crisp air of Coonoor, did put some pep into us and when we left our dear little wooden cabins for the thatched bamboo huts of Kargudi we were in a much better state of health.

On our arrival at Kargudi on the evening of second of February, we learned that one of the lorries, containing our provisions, had broken down somewhere on the way, and but for the timely help from the range officer we would have had a compulsory fast in the night. The next day the owner of the little shop on the main road was having record sales, and he certainly believed in making hay while the sun was shining. But even his stores could not last long, and that evening, the Instructors on knowing our sad plight came to our rescue, perhaps knowing that "Nature abhors a vacuum." Fortunately the lorry arrived that night.

Due to scarcity of rainfall this year we had some difficulty in obtaining our water supply. As we had two weeks only we had to finish the scheduled work by often working both morning and evening and so we had no swimming practice.

On Sunday, 9th February, our peace was rudely disturbed by the news of a wounded tiger reported to be in the vicinity, and soon the camp was agog with excitement, but later, to the relief of many we learnt, that the

big cat had expended all its nine lives by the time alarm had reached us. It would not be out of place here to mention our acquaintance with the grass ticks which more often than not forced their unwanted presence on us, and in consequence made us spend many a sleepless hour in bed.

N. P. Choksi,
*Junior Student.*

## 2. The Marathon Race, 1936.

The annual cross-country race which is one of the important events in the College Year, came off during the last week of February, during our stay in the head-quarters. This year, instead of the usual preliminary run, the students were simply taken round and shown the course on the 27th of February. A slight alteration in the course was made, thereby making the total distance of the course exactly 7 miles. The students manifested great zeal and enthusiasm in the contest, more so because of the inability to take part of senior student Bopaiya who is last year's champion, as this afforded them enough reasons to speculate on the possible winner.

On the 29th morning, when the final run was held, all the students assembled in the College Athletic ground at 6–15 A. M. There were in all 30 competitors out of the 37 students that form the present strength of the College. Just before starting the race, the Instructors proceeded to their respective obligatory points along the course, after which the race was started by the Vice-President, exactly at 6-35 A. M. From the beginning, students P. S. Sivaramakrishnan and Monnappa, were leading, but while within a mile or so to the winning point, senior student Sivaramakrishnan got the better of his rival aad after successfully overtaking him, came out first

and thus won the K. Ramaraja Mannarghat Moopil Nair Cup for Marathon Race Championship. He finished the course in 48 minutes and 42 seconds.

The following is the list of competitors who finished the course, up to the 10th place in the order of merit. It will be interesting to note that of these ten, five are Seniors and 5 Juniors.

| | | |
|---|---|---|
| 1. | P. S. Sivaramakrishnan | — (Senior Dn.) |
| 2. | C. C. Monnappa | — (Junior Dn.) |
| 3. | S. F. Uppin | — (Junior Dn ) |
| 4. | M. Z. Kuraishy | — (Senior Dn.) |
| 5. | P. K. Patnaik | — (Junior Dn.) |
| 6. | T. J. Abraham | — (Senior Dn.) |
| 7. | Abdul Khader | — (Junior Dn.) |
| 8. | P. Gopala Menon | — (Senior Dn.) |
| 9. | R. P. Patnaik | — (Junior Dn.) |
| 10. | Md. Ali Khan | — (Senior Dn.) |

The one striking feature of this race is that the Senior Division won the Inter-Divisional Cup by a difference of 4 points in the average. This may be considered to be in no small measure due to the improvement in their physique as a result of the training received in the Madras Forest College, during the past 21 months and more: It will not be out of place to mention here, that the present Senior Division lost the Cup last year, to their Seniors, which in itself is a sufficient proof of the above statement and let us hope that the same may be in store for our present Juniors.

K. R. Radhakrishnan,
*Hon. Secretary,*
*M. F. C. Athletic Club.*

## Second International Congress of Forestry, Budapest, 1936.

Our attention has been drawn to the rules, regulations and programme of the second International Congress of Forestry to be held in Budapest during September 10th to 14th of this year. The ninth International Congress of the Forest Research Organizations will also be held in Hungary a few days before the above Congress.

The first Congress of Forestry took place in Rome 1926. The aims of the congress are to bring about with international co-operation a proper balance between forest growth on the one hand and timber consumption on the other and to endeavour to solve the numerous problems connected with forestry, the timber trade and the utilization of wood. Questions embraced by the congress include forest statistics, forest policy, forest legislation, education and research, the technology of wood, the regeneration of forests, tending operations, the improvement of woodlands, soil investigation and the relation of forestry to national economy.

All correspondence on the above should be sent to the Central Committee, Kossuth Lajoster 11, Budapest, V.

— *Ed.*

## Notifications Relating to Rangers.

—(o)—

**Waltair Circle.**

15—1—36. Mr. G. Ramarao to Nugur Range Godavari Upper Division. 2. Mr. J. Theodore, to Bontha Range, Ganjam District.

15—I—36. Mr. B. V. Nagarajan, to Russulkonda Range, Ganjam District. 2. Mr. I. Sambasivarao Naidu, to Palakonda Range, Vizagapatam District. 3. Mr. A. S. Kaunds to Vinukonda Range, Guntur District. 4. Mr. P. Dhananjayarao to Narasapatam Range, Vizag District. 5. Mr. A. Subramanian, granted 4 months leave. 6. Mr. Abdul Razack to Udayagiri Range, Nellore District. 7. Mr. K. A. Muddayya to charge of Rapur Range, Nellore District. 8. Mr. C. S. Ganapathi, to Mahendra Range, Parlakimedi Maliahs.

15—1—36. Mr. D. Krishnasamaiah, to River Range, Godavari Lower Division. 2. Mr. T. Balaramaswami Naidu, to Mojjaguda Range, Ganjam Division. 3. A. Suryarao Naidu, to Gokavaram Range, Godavari Lower Division. 4. Mr. P. Gopalakrishna Rao, to Peddapuram Range, Godavari Lower Division. 5. Mr. V. N. Leapingwell, to Palnad Range, Guntur Division. 6. Ahmad Sheriff will until further orders, remain attached to Guntur District.

4—2—36. Mr. C. G. Krishna granted extension of leave as follows:- L. A. P. for four months from 26—10—1935 to 25—2—1936 and Leave on half average pay for 2 months in continuation thereof.

26—2—36. Mr. V. N. Leapingwell, to Balliguda Agency, Ganjam District. 2. Mr. Y. V. Anjaneyulu, to Palnad Range. District.

14—3—36. Mr. S. M. Ansur Ali, posted to Berhampur range in relief of Mr. M. Umapathi Mudaliar, transferred to Kanigiri Range, Kurnool South Division, Bellary Circle.

16—3—36. Mr. C. S. Ganapathy, posted to Balliguda Agency Range. This cancels his posting to Mahendra Range, and Ranger Abdul Razack's transfer to Udayagiri Range. 2. Mr. K. Subbanna, M. R. H. Forester Third Grade posted to to charge of Rapur Range, Nellore Division.

18—3—36. Mr. V. N. Leapingwell, leave for three months from 6—3—1936. 2. This cancels his posting to Balliguda.

7—4—36. Mr. A. S. Kaunds, Trained Forester and officiating Ranger last grade to continue to officiate as Ranger last grade from 1—4—1936 to 5—6—1936 *vice* Ranger V. N. Leapingwell on leave for 3 months from 6—3—1936.

## Bellary Circle.

18—3—1936. Mr. K. Purushothama Rao. Ranger Fifth grade, Kurnool South Division is granted extension of leave on half average pay on medical certificate for a period of one and half months from 9-3-1936 in continuation of the leave already granted in this office S. O. No. 11/36 dated 9–2–1936.

11—3—36. Mr. K. Tiruvenkatachari, to Sivapuram Range, Kurnool west Division. 2. Mr. T. Venkatasubbiah, on relief by No. 1 to Balapalle Range, Cuddapah South Division.

11—3—36. Mr. M. Umapathy Mudaliar, posted to Kanigiri Range, Kurnool South division. 2. Mr. B. Venkatarangam Forester First grade in charge of Kanigiri Range, on relief by No. 1 reverted to his permanent post in Kurnool West division.

17—3—36. Mr. S. M. Kristnaswami Ayyar, Rajampet Range granted leave for 4 months from the date of relief. 2. Mr. S. Varadarajulu Reddy, Kurnool East division permitted to return to duty before expiry of his leave and posted to Rajampet Range, Cuddapah South division vice No. 1.

17—3—36. A. Muthukrishna Mudaliar, on return from leave on 26–3–1936 posted to Sanipaya Range, Cuddapah South division. 2. Ansar Badsha Sahib, Trained Forester and acting Ranger, Sanipaya Range will on relief by No. 1 revert as Forester on special duty in Cuddapah South division.

21—3—36. Mohammad Ansar Badsha Sahib will on relief of Range charge in Cuddapah South division to revert to his permanent post of Forester in Cuddapah North division.

30—3—36. Mr. T. Venkata Subbiah posted to Chitvel Range. 2. Mr. H. Thammiah will continue as Range Officer, Balapalli.

## Working Plans Circle.

20—1—36. Mr. K. S. Muthanna, Forester Second grade, Komattiyur, No. I. Working Plans Division (Vellore) granted leave on average pay without medical certificate for 4 months from 1–2–36 to 31–5–36.

## Salem Circle.

15—2—36. C. B. Ekambaram, Trained Forester Second grade *sub-protem*, Salem Central division, on return from leave on 18–2–1936, appointed to act as Ranger last grade and posted to Rasipur Range, Salem South division, *vice* Mr. T. K. Parthasarathi Ayyangar, on leave or until further orders, to relieve Mr. S. V. Doraiswami Ayyar, Range officer, Namakkal of the additional charge.

23—2—36. Mr. P. Shunmugasundaram Pillai, granted further extension of leave for four months from 7–2–1936.

10—3—36. Mr. C. B. Pemmiah, Vellore West Division extension of leave for 2 months and 23 days from 9–3–1236 i.e., up to the end of 31st May 1936.

15—3—36. Mr. T. K. Parthasarathi Ayyangar, granted extension of leave for six months from 16–3–1936. 2. Mr. C. B. Ekambaram, Trained Forester Second grade (S. P. T.) and acting Ranger last grade, will continue to act as Ranger last grade, vice No. 1 granted leave or until further orders.

18—3—36. Mr. M. S. Krishnaswami Ayyar, Chittoor Division, granted an extension of leave on average pay on medical certificate for 4 months from 21–3–1936.

19—3—36. Mr. B. V. Vaideeswara Ayyar, Mamundur Range Chittoor Division granted leave for 3 months with effect from 9–4–1936 to 14–4–1936. 2. T. R. Vijayaraghavan, Trained Forester, working under Extra Assistant Conservator Mr. Abdul Karim Saheb, in Vellore East division, promoted to act as Ranger last grade and posted to Mamandur range from 15–4–1936, vice No. 1 on leave or until further orders.

21—3—36. Mr. Syed Munavar Saheb, extension of leave for 4 months from 18–3–1936, 2. M. M. Ponnappa, Trained Forester and Acting Ranger last grade will continue to act as Ranger last grade, vice No. 1 or until further orders

27—3—36. Mr. M. M. Ponnappa, Chandragiri Range, will relieve Mr. B. V. Vaideeswara Ayyar, Mamundur Range (granted leave) on 9–4–1936 and be in additionol charge of Mamundur range till Mr. T. V. Vijayaraghavan, trained Forester and Ag. Ranger, last grade, joins duty in Mamundur Range or until further orders.

18—4—36. Mr. Mac Bride, Ranger Tirupattur to Krishnagiri Range. 2. Mr. Rangamannar Doss, Ranger Krishnagiri to Tirupattur Range. No. 1 to move first by handing over temporarily to Mr. P. Krishnaswami Mudaliar, Depot Ranger.

## Coimbatore Circle.

7—3—36. Mr. S. Venkatarama Ayyar, for special duty to Coimbatore North. He will report for duty before the Range Officer Satyamangalam.

30—3—36. A. Kunhunni Nair, Bargur Range, Kollegal Division, transferred to Ootacamund Circle. 2. Mr. S. Venkatarama Ayyar, on special duty, Coimbatore North Division, posted to Bargur Range, Kollegal Dlvision vice No. 1.

30—3—36. Mr. C. R. Raghunathan, transferred for special duty to Coimbatore South Division.

17—4—36. Mr. M, Gopalswami Naidu Ranger Seventh grade Temporary on special duty in Madura division transferred for Special duty in Coimbatore North division. He should report himself for duty before the Range Officer Satyamangalam.

19—4—36. Mr. C. R. Ragunatha Ayyangar, on special duty in Kodaikanal granted leave for 2 months from 16-3-1936.

**Ootacamund Circle.**

24—1—36. The posting of Mr. C. Raghunathan, to Udipi Range is cancelled and he is posted to Segur Range, the Nilgiris Division. 2. Mr. C. J. Muthanna, posted to charge of Udipi Range to relieve Mr. J. S. Rowland. 3. Mr. M, S. Subbiah, transferred tc Nilambur Division as Assistant to the Range Officer, Nilambur.

14—2—36. Mr. K. M. Achayya, transferred to charge of Palghat Range, *vice*, S. Nageswara Ayyar, transferred to Working Plans Circle.

19—2—36. Mr. B. Coates, on completion of special work in the Nilgiris, to Segur Range, The Nilgiris Division. 2. Mr. M. S. Subbiah, on relief by No. 1 to Nilambur division as Assistant to the Range Officer, Nilambur.

2—3—36. P. Madhavan Nair, to Palghat Range, Palghat division. Mr. K. M. Achayya, on relief by No. I is retransferred to Nilambur Division as Assistant to the Range Officer, Amarampalayam Range.

2—3—36. Mr. M. S. Subbiah, leave for 2 months from date of relief from charge of Segur Range by Ranger Mr. B. Coates.

9—3—36. Mr. P. K. Sankara Menon, Assistant Ranger, Begur Range posted temporarily to Mysore and Nanjangud depots *vice*, Mr. R. Subramania Ayyar, granted leave for two months from 18th March 1936 preparatory to retirement; to join forthwith.

9—3—36. Mr. P. A. Madavan, extension of leave for four months from 17th March 1936. He should obtain a requisition letter for examination by the District Medical Officer a week before the expiry of his leave.

29—3—36. Mr. H. E. Brown, Extra Assistant Conservator on special duty in Wynaad posted to Chedleth Range, till the return of Ranger Mr. K. Sankaranarayana Rao from leave, or until further orders. 2. Mr. A. Muhammad Akbar, temporarily in charge of Chedleth Range, to be Assistant Range Officer, Chedleth on relief by No. (1).

30—3—36. Mr. K. M. Achayya, Palghat Range, on relief by Ranger Mr. P. Madhavan Nair, transferred to Wynad Division to Sultan's Battery Range. 2. Mr. Thomas Thachil, Sultan's Battery Range, on relief by No. 1 posted to Mysore Depot, Wynad Division. 3. Mr. P. K. Sankara Menon. Mysore Depot, on relief by No. 2, transferred to Mangalore North Division, and posted to Udipi Range.

1—4—36. Mr. A. K. Kunhunni Nair, posted to Mudumalai Range, The Nilgiris Division. 2. Mr. K. Karunakaran Nambiar, Mudumalai Range, on relief by No. (1) posted to Udipi Range. 3. Mr. K. M. Achayya, on relief from Palghat Range, posted as Assistant to the Range Officer, Begur. 4. Mr. P. K. Sankara Menon, on relief from Mysore Depot by Mr. Thomas Thachil posted to Sultan's Battery Range, Wynaad Division.

3—4—36. Mr. C. J. Muthanna, on relief by Ranger Mr. K. Karunakaran Nambiar, is transferred to Nilambur Division.

25—4—36. Mr. C. J. Muthanna, Trained Forester Udipi Range, Mangalore North Division, granted leave for four months from date of relief from Udipi Range.

# NOTICE.

## "Indian Forester Prize" - 1936.

Essay Prize for PAST Students of the College.

*The subject for the essay is :—*

"A RANGER'S EXPERIENCE IN CONDUCTING FOREST CASES."

**A prize of the value of about Rs. 25/- will be awarded for the best essay from past students.**

**No award will be made unless a satisfactory standard is reached. The essay should be clearly written or typed on one side of the paper only and should not exceed 2000 words. It should be submitted to reach the Principal, Madras Forest College between the 10th May and 1st June 1936. Any not received within this period will not be considered. The essay should be the unaided work of the competitor.**

***P. W. DAVIS.***

# NOTICE.

## "Indian Forester Prize" - 1936.

Essay Prize for PRESENT Students.

*The subject for the essay is :—*

"THE IMPORTANCE OF ECOLOGY IN FORESTRY."

A prize of the value of about Rs. 25/- will be awarded to the best essay by present students of the College. No award will be made unless a satisfactory standard is reached. The essay should be clearly written or typed on one side of the paper only and must reach the Principal between the 10th May and 1st June 1936. Any essay not received within this period will not be considered.

The essay should not exceed 2000 words. It should be the unaided work of the competitor.

*P. W. DAVIS.*